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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/902,859	07/11/2001	Evangelos Stavros Eleftheriou	CH920010036US1	1679

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IBM CORPORATION
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EXAMINER

CHASE, SHELLY A

ART UNIT PAPER NUMBER

2133

DATE MAILED: 10/22/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary

Application No.

09/902,859

Applicant(s)

ELEFThERIOU ET AL.

Examiner

Shelly A Chase

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 July 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1 to 14 are presented for examination.

Specification

2. The disclosure is objected to because of the following informalities: please provide a copy of each reference cited in the specification.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1 to 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bond et al. (*Constructing Low-Density Parity- Check Codes*, IEEE) in view of Richardson et al. (*Efficient Encoding of Low-Density Parity-Check Codes*, IEEE).

Claims 1 and 5:

Bond substantially teaches the claimed invention. Bond teaches constructing low density parity check codes (LDPC) by first identifying the matrix [R:C] (see pg. 260, sect. II), and constructing a parity matrix by limiting the rows and columns (see pg. 260,

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sect III); interpreted as "generating, based on the first parity check matrix, a second parity check matrix having an $M \times M$ triangular sub-matrix." Bond does not specifically teach mapping the data into an LDPC codeword based on the second parity check matrix; however, Richardson in an analogous art discloses efficient encoding of LDPC codes wherein sub-matrices are created from the parity check matrix and then encoded (see pg. 641 to 642). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the LDPC codes of Bond to include encoding based on the second parity check matrix as taught by Richardson. This modification would have been obvious because a person of ordinary skill in the art would have been motivated to employ creating smaller codes for effective encoding and decoding as taught by Richardson (see pg. 638) sect. 1).

As per claims **2** and **6**, Bond discloses limiting the codes to a short cycle of 4 by permutation (see pg. 261 par. 2).

As per claims **3** and **7**, Bond discloses creating the parity check matrix via circulant matrix (see pg. 261, par. 1).

As per claims **4** and **8**, Bond discloses setting the vertices of each bit in the bipartite graph to a parity equation vertex (see pg. 260, sect. III); interpreted as "setting entries along the main diagonal of the $M \times M$ triangular sub-matrix to the same value."

Claims **9**, **13** and **14** are similar to claim 1 except for the computer program product, a data transmitter and a data storage system; however, Bond discloses the constructing of the LDPC codes are for a wide range of communication system, which

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broadly encompasses the claimed devices. Thus, claims 9 to 12, 13, and 14 are rejected based on the same rationale applied to claim 1 and dependent claims 2 to 4.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shelly A Chase whose telephone number is 703-308-7246. The examiner can normally be reached on Mon-Thur from 8:00 am to 6:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Albert Decady can be reached on 703-305-9595. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-9600.


Shelly A Chase